



EOD Warrior Athlete Working Group: Recommendations for an Evidence-Based, Forcewide, EOD Warrior Athlete Program

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Naval Health Research Center

Report No. 14-35

The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, nor the U. S. Government.

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EXECUTIVE SUMMARY

Bottom Line Up Front

U.S. Navy Explosive Ordnance Disposal (EOD) operators must perform optimally under the harshest conditions, yet there is no program to build and sustain physical readiness and performance across the EOD career. Thus, there is an urgent need to implement an EOD Warrior Athlete Program.

Background

U.S. Navy EOD is the world's premier combat force for countering explosive hazards. The modern EOD Warrior must regularly demonstrate and maintain superior physical fitness, a tough combat mindset, and a resistance to and/or speedy recovery from musculoskeletal injury, analogous to today's scientifically trained elite athlete.

Problem Statement

Presently, there is no program to promote and sustain physical readiness and performance across the EOD career. Accordingly, there is an immediate and urgent need to envision, develop, implement, and institutionalize an EOD Warrior Athlete Program.

Process

Eleven active-duty stakeholders in the EOD community teamed with 15 scientists from the Naval Health Research Center and San Diego State University Doctor of Physical Therapy Program to outline a comprehensive EOD Warrior Athlete Program. This team was named the EOD Warrior Athlete Working Group.

Operational Requirements for the EOD Warrior Athlete Program

The Working Group outlined specific physical (e.g., muscular strength, aerobic endurance), mental (e.g., performance under extreme stress), and environmental operational requirements (e.g., extreme temperatures, dehydration) for all EOD Warrior Athletes.

Critical Elements of the EOD Warrior Athlete Program

Three critical elements of the EOD Warrior Athlete Program were identified: (1) exercise physiology and nutrition, (2) injury prevention and rehabilitation, and (3) combat mindset.

Implementation Plan for EOD Warrior Athlete Program

The Working Group then identified three phases of implementation. They include (1) assessment (establish baseline markers of readiness, which will then be used to inform targeted educational approaches and individualized training), (2) education (disseminate forcewide instructions to optimize physical and mental readiness), and (3) individualized training (provide scientifically derived training programs meeting the needs of each EOD Warrior Athlete).

Cost Estimation and Candidate Funding Lines

Scalable cost estimation was provided, and three overlapping funding lines were identified.

Program Evaluation

Program effectiveness will be measured via assessment scores across time, performance on standardized training regimens, injury and attrition, and participant evaluations.

BOTTOM LINE UP FRONT

U.S. Navy Explosive Ordnance Disposal (EOD) operators must perform optimally under the harshest conditions, yet there is no program to promote and sustain readiness and performance across the EOD career. Thus, there is an urgent need to implement an EOD Warrior Athlete Program.

BACKGROUND

U.S. Navy EOD is the world's premier combat force for countering explosive hazards, including improvised explosive devices, weapons of mass destruction, underwater mines, and other types of weaponry.

EOD personnel are highly trained, skilled Warriors with expertise in explosives, diving, and parachuting. They render safe all types of ordnance, including conventional, improvised, chemical, biological, radiological, and nuclear. They specialize in complex, clandestine operations, routinely embedding within units of U.S. Special Operations Command, including direct action support of U.S. Navy SEALs and Army Special Forces.

As evidenced in recent conflicts, the modern EOD Warrior must regularly demonstrate and maintain (1) superior physical fitness, comprising muscular strength, explosive power (exerting a maximal amount of force in the shortest time possible), aerobic endurance, and resilience to environmental extremes; (2) resistance to and/or speedy recovery from musculoskeletal injury and fatigue; and (3) a tough combat mindset, allowing for the preservation of high neurocognitive function and tactical awareness despite exposure to chronic/extreme operational stress.

These demands, remarkably similar to those placed on elite competitive athletes, are routinely exacerbated by unpredictable operational requirements, unforgiving extreme environments, life-or-death contexts, and combat trauma. An in-theater study of expeditionary sailors deployed to Afghanistan showed that 9 of 73 EOD operators (12.5%) sustained a head injury during the current deployment, while 37.0% reported high levels of combat exposure as measured by a standardized scale. More than half (51.6%) reported receiving at least 1 hour less sleep per night than that required to feel well-rested (Schmied, E. unpublished data).

PROBLEM STATEMENT

Despite the EOD Warrior's responsibility to maintain superior physical fitness, resistance to physical injury, and a tough combat mindset, there is currently no program in place to promote and sustain these fundamental requirements across the EOD career. In fact, the only available information source regarding EOD fitness across the career is the Navy Physical Readiness Test (PRT), which has been shown to poorly estimate EOD job performance (Hodgdon, Beckett, Sopchick, Prusaczyk, & Goforth, 1998). Accordingly, there is an immediate and urgent need to envision, develop, implement, and institutionalize an EOD Warrior Athlete Program. The program must draw upon the best available scientific evidence to accurately assess, systematically educate, and individually train every EOD Warrior Athlete across his or her entire EOD career. Specifically, the program must:

- **Assess** operationally relevant health and readiness parameters accurately, scientifically, and systematically across the entire EOD career;
- **Educate** every EOD Warrior Athlete about scientifically based methods to achieve and sustain superior physical fitness, resistance to physical injury, and a combat mindset across the EOD career;
- **Train** every EOD Warrior Athlete in a way that yields quantifiable improvements in each readiness parameter. This training must comprise a holistic, total-warrior approach that promotes health and readiness throughout the entire EOD career.

PROCESS

To address the problem, 11 active-duty stakeholders from COMEODGRU ONE, COMEODGRU TWO, CEODD, EODMU ONE, EODMU THREE, EODMU ELEVEN, and EODTEU ONE teamed with 15 scientists from the Naval Health Research Center (NHRC) and San Diego State University Doctor of Physical Therapy Program to outline key requirements, key elements, implementation plans, and funding strategies for a comprehensive EOD Warrior Athlete Program. This team was named the EOD Warrior Athlete Working Group.

The meeting was held 10–11 JUN 2014, at the Warfighter Performance Department, NHRC, San Diego, California (see Appendix A for full agenda). During these 2 days, the Working Group achieved the following milestones:

- Established operational and career-span health and readiness requirements to which the EOD Warrior Athlete Program must be responsive;
- Defined key elements of the EOD Warrior Athlete Program;
- Developed an implementation plan for the EOD Warrior Athlete Program;
- Developed a scalable budget and identified candidate funding lines to launch and sustain the Program.

OPERATIONAL REQUIREMENTS FOR EOD WARRIOR ATHLETE PROGRAM

EOD Warrior Athlete requirements were organized according to three universal, interrelated challenges: physical, mental, and environmental.

1.0 Physical Requirements

1.1 Aerobic Endurance

The EOD Warrior athlete must perform long, sustained aerobic endurance events with varied load configurations in water and/or on land at high, submaximal aerobic intensities (~70–85% $\text{VO}_{2\text{peak}}$) for varying durations, typically exceeding several hours.

1.2 Muscular Endurance

The EOD Warrior Athlete must perform upper- and lower-body muscular endurance events with varied load configurations—including but not limited to climbing, walking with heavy load configurations, and carrying heavy tools and equipment—for varied durations that may exceed several hours.

1.3 Muscular Strength

The EOD Warrior Athlete must perform activities requiring substantial upper- and lower-body muscular strength—including but not limited to regularly lifting and/or carrying heavy equipment or weaponry exceeding 100 pounds, and full suit walking—typically in suboptimal ergonomic configurations (e.g., straight-leg lifting). Prior researchers have concluded that strength and power tests are useful in predicting EOD job task performance (Hodgdon et al., 1998).

1.4 Explosive Power

Typically interspersed within endurance events, the EOD Warrior Athlete must perform activities requiring explosive anaerobic power (i.e., requiring effective adenosine triphosphate-creatine phosphate and glycolytic substrate utilization; American College of Sports Medicine, 2014). This includes but is not limited to explosive jumping, sprint swimming, sprint running, sprint climbing, and combatives, all with varied load configurations.

1.5 Fatigue Resistance

The EOD Warrior Athlete must combat fatigue on nearly every mission. Operators routinely begin missions in a fatigued state due to the physical and mental stress of transit, and it is common to conduct multiple back-to-back missions, thus compounding their fatigue.

1.6 Nutritional Sustainment

Malnourishment and food deprivation are very common during deployments. EOD operators often go without food, or even clean water, for extended periods of time. At times, the transition from clean eating in garrison to poor eating during deployment (poor options and sometimes lack of options) increases the stress on the body. There is a need for an EOD MRE or vitamin regimen, different meal replacements, and hydration and nourishment options that cater to specific environments.

1.7 Prevention of and Recovery From Musculoskeletal Injury

Most EOD missions involve cumulative hyperdynamic events, repetitive impact, and vibration exposure. The EOD Warrior Athlete must be able to withstand these events and recover quickly from injury. Clinical data suggest that a disproportionate percentage of

EOD personnel present with spine degeneration, quantified by spinal x-ray (Robinson, T., personal communication, June 10, 2014).

2.0 Mental Requirements

2.1 Performance Under Extreme Psychological Stress

EOD operators must perform optimally under conditions of extreme psychological stress. Psychological stress has the potential to erode or catastrophically degrade performance when not managed appropriately (Hardy & Parfitt, 1991). An in-theater study of expeditionary sailors deployed to Afghanistan showed that 1 in 5 EOD operators (21.9%) experienced intense fear, helplessness, or horror while on the current deployment (Schmied, E., unpublished data).

2.2 Coping With Isolation

EOD missions involve long periods of isolation with rudimentary communication. It is common to experience extreme solitude under already highly stressful circumstances.

2.3 Neurocognitive Function and Fine Motor Skills

An EOD Warrior Athlete must preserve neurocognitive function (e.g., locate objects in water via coordinates, using fine motor skills) under adverse circumstances. One must maintain focus for extended periods of time and/or focus at a moment's notice despite extreme fatigue and operational stress. Superior cognitive function, mental recall, and attention to detail are constant operational requirements.

2.4 Unit Cohesion

Success of EOD missions depends on unit cohesion. Although EOD operators report high internal unit cohesion in the deployed setting (Schmied, E., unpublished data), EOD teams frequently embed with other units where internal unit cohesion may not necessarily exist and must be developed rapidly.

2.5 Sleep Disruption and Deprivation

EOD operators must regularly complete tasks in a sleep-deprived state. Chronic sleep disruption leads to sleep debt, which is known to influence judgment, decision making, and concentration (Drummond, Paulus, & Tapert, 2006).

2.6 Reset in Garrison

Following deployments, EOD operators must downshift from combat alertness to a calmer mindset. This includes diminished "fight or flight" levels as exemplified by lowered reactivity and diminished readiness for aggression, along with greater patience and sense of calm.

3.0 Environmental Requirements

EOD Warrior Athletes routinely encounter vibration, impact shock, hot–cold temperature swings, heat stress, humidity, altitude, and diverse terrain.

CRITICAL ELEMENTS OF EOD WARRIOR ATHLETE PROGRAM

Reflecting the Operational Requirements outlined above, design of the EOD Warrior Athlete Program will be guided by three critical elements needed to confer maximal health and performance: (1) exercise physiology and nutrition, (2) injury prevention and rehabilitation, and (3) combat mindset.



Figure 1. EOD Warrior Athlete Program critical elements.

✓ **Critical Element 1: Exercise Physiology and Nutrition**

This element is required to maintain operational capabilities among operators by (1) scientifically assessing exercise capacity and nutritional status, (2) providing education about these topics, and (3) providing evidence-based training that not only meets the unique needs and circumstances of each operator but is also responsive to mission requirements and deployment cycles.

✓ **Critical Element 2: Injury Prevention and Rehabilitation**

This element is required to maintain operational capabilities through the prevention and expedient treatment of musculoskeletal injuries. The EOD community sustains a high number of training-related injuries, particularly musculoskeletal injuries to the shoulders, knees, and back; moreover, x-rays have indicated orthopedic damage to the spine (Robinson, T., unpublished data). A comprehensive, evidence-based assessment, and educational physical training program will incorporate both preventive and rehabilitation exercises and will be responsive to mission requirements and deployment cycles.

✓ **Critical Element 3: Combat Mindset**

This element is required to strengthen operators' performance-related mindset using scientifically based principles of sport and military psychology. Most EOD missions require exceptionally high levels of concentration, neurocognitive function, and psychological resilience in harsh, stressful environments with life-or-death consequences. EOD Warrior Athletes must be mentally prepared to enter situations that are both physically and mentally taxing, such as working in isolation under water with strict time constraints.

EOD WARRIOR ATHLETE PROGRAM IMPLEMENTATION PLAN

The EOD Warrior Athlete Program will be implemented in three distinct, overlapping phases: (1) assessment, (2) education, (3), and individualized training.

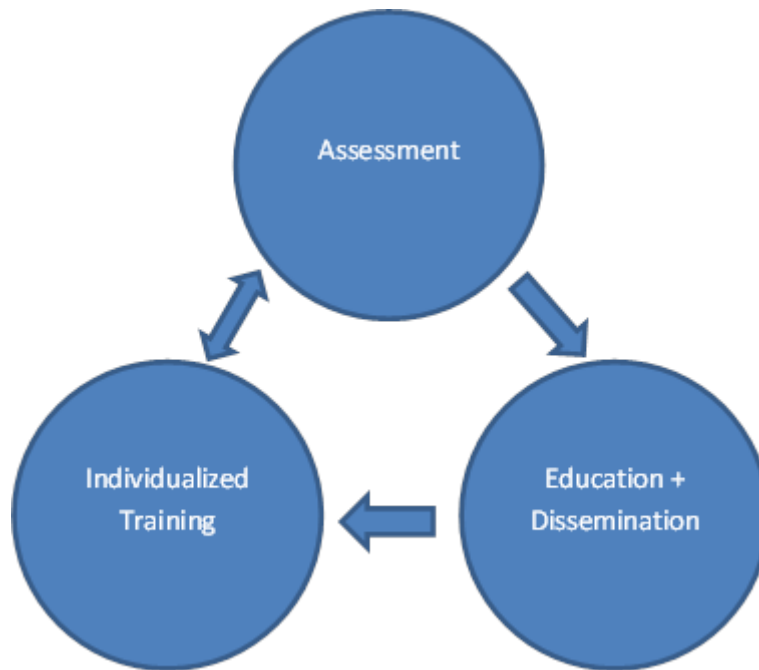


Figure 2. EOD Warrior Athlete Program phases.

Phase 1: Assessment

- **Purpose**

The purpose of the assessment phase is threefold. First, assessment data will establish baseline markers of health and readiness within the community, which will then be used to inform targeted educational approaches and individualized training. Second, assessment data will be used to identify and quantify wear-and-tear effects on the EOD Warrior Athlete across time, thus offering periodic “pivot points” for prompt restoration. Third, the assessments will be used to evaluate the effectiveness of education and training, which may require periodic refinements over time.

At present, the only physical fitness metric maintained for EOD personnel are scores from the semiannual PRT. However, the available research indicates that the PRT is a poor predictor of operationally relevant EOD job tasks (Hodgdon et al., 1998), and the U.S. Navy diver screening test is a poor predictor of representative job task performance (Marcinik, Hyde, & Taylor, 1995). Therefore, it is crucial to identify a multifaceted, comprehensive, and scientifically advanced battery of assessments with a high likelihood of capturing operationally relevant capabilities.

- **Criteria**

Assessments conducted in the program must be feasible, based on available resources, and *actionable* such that the program will only measure endpoints that have the capacity to directly inform programmatic development.

- **Assessment Overview**

Critical Element 1: Exercise Physiology and Nutrition

✓ **Graded Exercise Test**

The gold-standard assessment of aerobic capacity (American College of Sports Medicine, 2014), applicable to both land and water operational requirements; will be used to develop highly specific and individually prescribed training programs.

✓ **Wingate Anaerobic Test**

This test measures peak anaerobic power, an operationally relevant performance capability involving high-intensity bursts of anaerobic exercise (i.e., exercise performed at a demand exceeding oxygen availability). It consists of a set time pedaling at maximum speed against a constant force (Bar-Or, 1987).

✓ **Muscular Strength Assessment (1 Repetition Maximum)**

This is a resistance-training-based assessment, which is particularly relevant for tasks such as ladder climbing, lifting, and carrying heavy equipment.

✓ **Body Composition, Body Mass, and Bone Mineral Density**

Dual-energy x-ray absorptiometry technology is used to provide accurate measures of body fat percentage, fat-free body mass, and bone-mineral density (quantifying risk of stress fracture). Prior research suggests that total body mass and fat-free mass are consistent predictors of operationally relevant EOD job tasks (Hodgdon et al., 1998).

✓ **Nutritional Assessment**

Current nutrition is easily and affordably assessed via blood/urine/saliva samples, food diaries, resting metabolic rate, and total energy expenditure during pre- and post-deployment. This is instrumental in the development of individualized nutrition plans.

✓ **Hydration Assessment**

Hydration may be quantified through measurement of blood, urine, or saliva osmolality assessed via dipstick, urine color test, or refractometer. Establishing standard hydration requirements under various environmental conditions as well as across diverse mission demands will serve to optimize individual performance and health.

Critical Element 2: Injury Prevention and Rehabilitation

Functional Measures (Teyhen, Riebel, McArthur, Savini, & Mackenzie, 2014)

✓ **Functional Movement Screen (FMS; Functional Movement Systems, Chatham, VA)**

This is a valid and reliable instrument used to establish risk of musculoskeletal injuries; it guides the development of training plans designed to reduce injury risk. The FMS will be used to assess the quality of specific movement patterns in order to identify asymmetries and deficiencies in movement.

Y-Balance Test – Lower Quarter (YBT-LQ)

The YBT-LQ, a version of the Star Excursion Balance Test, is a measure of dynamic balance. It is used to assess physical performance, recognize chronic ankle instability, and identify athletes at greater risk for lower extremity injury.

Y-Balance Test – Upper Quarter (YBT-UQ)

The YBT-UQ, a variation of the YBT-LQ (uses the same equipment), is used to obtain a quantitative measure of trunk and upper extremity stability and mobility.

Hop Tests

This series of hop tests (single leg hop for distance, single leg land, counter-movement jump) is used to assess lower extremity strength, power, and agility. Participants jump onto a force plate that objectively records ground reaction forces, loading rate, power, dynamic stability, and jump height.

✓ **Gait Analysis**

This is used to assess, plan, and treat individuals with musculoskeletal conditions that affect their ability to walk or run. Gait analysis is also commonly used in sports biomechanics to help athletes run more efficiently as well as to identify posture- or movement-related problems in injured athletes.

✓ **Traumatic Brain Injury (TBI)/Concussion Screen**

This is a balance-based screening technology for detection of mild traumatic brain injury (mTBI) and concussion. Early identification is critical for successful recovery from mTBI. Not only does early identification lead to early treatment, but it also prevents the occurrence of second impact syndrome, a catastrophic brain injury that results when a second concussion occurs before symptoms from the first concussion (even a minor one) have subsided.

Critical Element 3: Combat Mindset

✓ **Stress Hormone Profiles**

These profiles use noninvasive saliva sampling to identify hormonal imbalances, to detect wear-and-tear effects, and to establish anabolic versus catabolic state of readiness. Lower testosterone concentration was linked to greater sleep disruption in an exploratory study of elite military men (Markwald, Taylor, Larson, & Drummond, 2013).

✓ **Sleep Screen**

The sleep screen scientifically evaluates sleep health via self-report, actigraphy, and/or new emerging mobile sleep monitoring technologies (e.g., smart textile shirt). In the short term, sleep disturbances leads to myriad negative cognitive and physiological consequences. Furthermore, long-term sleep disruption is a strong predictor of chronic disease, metabolic disturbances, and mental health disorders.

✓ **Psychological Skills Assessment**

A thorough yet noninvasive psychological skills assessment includes a brief battery of scientifically valid and reliable measures of operationally relevant psychological skills

(i.e., goal setting, arousal control, mental imagery, self-talk) and neurocognitive function. These surveys have been used and validated among high-level athletes to assess readiness (Taylor, Gould, & Rolo, 2008). In the EOD Warrior Athlete Program, these data will be used to develop individualized training programs to sharpen combat mindset and to facilitate mental reset in garrison.

Assessment Logistics

✓ Locations

COA 1

Five locations: EODGRU2, EODGRU1, EODMU FIVE, NAVSCOLEOD, and EODMU EIGHT.

COA 2

Three locations: EODGRU2, EODGRU1, and NAVSCOLEOD.

✓ Timing

COA 1

Three time points over 24-month period: baseline, just prior to deployment, and post-deployment; similar data collection process for students, instructors, and nondeployers to ensure “cradle-to-grave” metrics.

COA 2

Once every 24 months during early training (possibly during 50-40 week); overlap can occur with Periodic Health Assessment, and some assessment components can be incorporated into work-up period.

✓ Considerations

Assessment schedules should align with training cycles, but also at regular intervals (i.e., annually, or other set time), so that no individual is left out of the assessment. Of importance will be the need to determine how many assessments and participants are needed to see change and/or produce meaningful results, and how many times individuals should go through an assessment “cycle.” Over time, it may be useful to modify assessment scope to only include most relevant and/or needed assessments. EOD medical, NHRC, and EOD training will need further discussions to ensure synchronization and to identify efficiencies for capturing the needed assessments.

Phase 2: Education

▪ Purpose

The purpose of this phase is to broadly disseminate an educational curriculum among EOD leaders and operators designed to improve health and readiness. The curriculum will include **forcewide instructions** and/or **published guidelines** addressing each of the three critical elements outlined above (exercise physiology and nutrition, injury prevention and rehabilitation, and combat mindset). A secondary aim of this phase is to establish a culture of fitness based on the best available scientific evidence.

- **Considerations**

- ✓ The educational curriculum will be included in all components of the EOD program, from prep course to dive school to basic course, and so on.
- ✓ It may be relatively easy to incorporate into preexisting infrastructure and program schedules. That is, presently there is already a proven process in place for how to incorporate a new curriculum.
- ✓ A similar approach has been completed informally in house, which can be viewed as a “pilot” study.
- ✓ The curriculum will be strict and programmatic, with a clear message.

Phase 3: Individualized Training

- **Purpose**

The goal of this phase is to develop individualized training programs based on scientific data collected during the assessment phase. Thus, the training program will be **tailored to meet the unique needs of each EOD Warrior Athlete**.

- **Considerations**

- ✓ Comprehensive individualized training will include staffing with expertise in nutrition, physical therapy, exercise physiology, and applied sport psychology.
- ✓ Adding a personalized component will increase the chance of buy-in because it will show value of and provide care for each person.
- ✓ Individualization will meet the highest standards possible.

COST ESTIMATION (MODULAR/SCALABLE)**Phase 1: Assessment****Assessment Site Start-Up Costs (one time)**

NHRC Site.....	\$0.00 (in place)
Detachment Site Start-Up.....	\$150,000 per site
Contract Labor.....	\$10,000 per site

Assessment Site Management (per year)

NHRC Site Infrastructure.....	\$50,000/yr
Additional Site Infrastructure.....	\$50,000/yr per site
Contract Labor (total burden) – 1 FTE.....	\$175,000/yr per site

Phase 2: Education**Education: Start-Up Costs (one time)****Contract Labor**

SME Research for EOD Instruction/Guidelines – 6 months.....	\$150,000 (one time)
EOD Instruction/Guidelines Authorship – 6 months.....	\$150,000 (one time)

Education: Maintenance Costs (per year)

Periodic Update/Revision	
Instruction/Guidelines.....	\$10,000/yr
Dissemination.....	\$10,000/yr

Phase 3: Individualized Training (per year)**NHRC Site Contract Labor (total burden)**

Exercise Physiology/Nutrition .5 FTE.....	\$75,000/yr
Injury Prevention .5 FTE.....	\$75,000/yr
Combat Mindset .5 FTE.....	\$75,000/yr

Detachment Site Contract Labor (total burden) 1 FTE..... \$150,000/yr per site

CANDIDATE FUNDING LINES (MODULAR/SCALABLE)

Three overlapping funding lines include:

- Direct funding from EOD community
 - ✓ Pros
 - More expedient start-up
 - Autonomy: NHRC works directly for EOD with minimal interference
 - ✓ Cons
 - Budgetary constraints
- BUMED (O/M funds)
 - ✓ Pros
 - Offsets cost burden for EOD community
 - ✓ Cons
 - Competitive proposal process
 - Slower timelines
 - Annual renewal process
- DoD Research Sponsorship (e.g., Office of Naval Research, Congressionally Directed Medical Research Program, DARPA, IARPA)
 - ✓ Pros
 - Offsets cost burden for EOD community
 - ✓ Cons
 - Competitive proposal process
 - Slower timelines
 - Annual renewal process

PROGRAM EVALUATION

Effectiveness of the EOD Warrior Athlete Program will be measured via:

- Objective assessment across time
- Performance on standardized training evolutions
- Prevalence of injury and return-to-duty rates
- Attrition
- Participant evaluations

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DEDICATION

This report is dedicated to all U.S. Navy EOD Warrior Athletes who place themselves in harm's way so others can be safe.

Appendix A

Meeting Agenda

EOD Warrior Athlete Working Group

(10–11 JUN 2014)

MISSION

1. Define **requirements** for EOD Warrior Athlete Program.
2. Outline **key components** of EOD Warrior Athlete Program.
3. Develop **implementation plan**.
4. Establish **budget** and identify **funding plan**.

ATTENDEES

EOD:	EODCM Stump	COMEODGRU ONE, N7
	LCDR Haywood	COMEODGRU ONE, NO1
	LT Mendenhall	COMEODGRU ONE, N7
	CAPT Robinson	COMEODGRU ONE, NOOM
	CMDCM Beville	COMEODGRU ONE, NOOC
	EODCM Leppell	COMEODGRU TWO, N7
	EODCS Deciutiis	CEODD
	EODCS Anderson	EODMU ONE, Senior Enlisted
	EOD1 Munden	EODMU THREE, Junior Enlisted
	LT Dewey	EODMU ELEVEN, EOD Officer
	LTJG McElmoyl	EODTEU ONE, LDO

NHRC:	Marc Taylor, PhD	Co-Moderator; SME, Sport Psych
	Patrick Nardulli	Co-Moderator; SME, Operational Stress Control
	Genieleah Padilla	Coordinator, Requirements Document Manager
	Emily Schmied, PhD(c)	Coordinator, Requirements Document Manager
	Jerry Larson, PhD	SME, Behavioral Health
	LT Erica Harris, PhD	SME, Behavioral Health
	Heidi Kraft, PhD	SME, Behavioral Health
	Lisa Hernandez, MS	SME, Exercise Physiology/Nutrition
	Michael Stone, MS	SME, Exercise Physiology/Nutrition
	Jennifer Carpenter, MS	SME, Exercise Physiology/Nutrition
	LCDR Dominguez, PhD(c)	SME, Biomechanics/Physical Therapy
	Pinata Sessoms, PhD	SME, Biomechanics/Physical Therapy
	Mitchell J. Rauh, PhD, PT	SME, Biomechanics/Physical Therapy
	Gena Glickman, PhD	SME, Sleep Physiology
	Shiloh Beckerley, PhD	SME, Health Surveillance/Longitudinal Assessment

SCHEDULE

DAY 1 (TUES 10 JUN 2014)

0800 ARRIVE/COFFEE/INFORMAL

0830 WELCOME

- Introductions and Goal Setting

0900 Overview of EOD Warrior Athlete Programming Vision (EOD STAFF)

- Mission-related performance demands
- Deployment cycles
- In-garrison, training, and workup demands
- The “Dream” EOD Warrior Athlete Program!

0945 Overview of NHRC Warfighter Performance Capabilities

- Biobehavioral Sciences Lab (Taylor)
- PhyCore Biomechanics Lab (Sessoms)

1000 “How Can We Help?” SME Input (5 min each)

- Exercise Physiology & Nutrition (Hernandez)
- Sleep Physiology (Glickman)
- Biomechanics & Physical Therapy (Dominguez)
- Sport Psych/Operational Stress Control (Taylor, Nardulli)
- Behavioral Health (Larson)

1030 BREAK

1040 Tour, Warfighter Performance Lab (Nardulli/Dominguez/Sessoms)

1130 Lunch (provided)

1215 Whiteboard Workshop/Draft Requirements Document (all)

- Define operational requirements for EOD Warrior Athlete Program
- Outline key components of EOD Warrior Athlete Program

1450 Summary

1500 *ADJOURN*

DAY 2 (WED 11 JUN 2014)

0800 ARRIVE/COFFEE/INFORMAL

0830 Whiteboard Workshop/Draft Requirements Document (all)

- Implementation Plan
- Budget and Funding Lines
- Group Photo

1100 *ADJOURN*

Appendix B

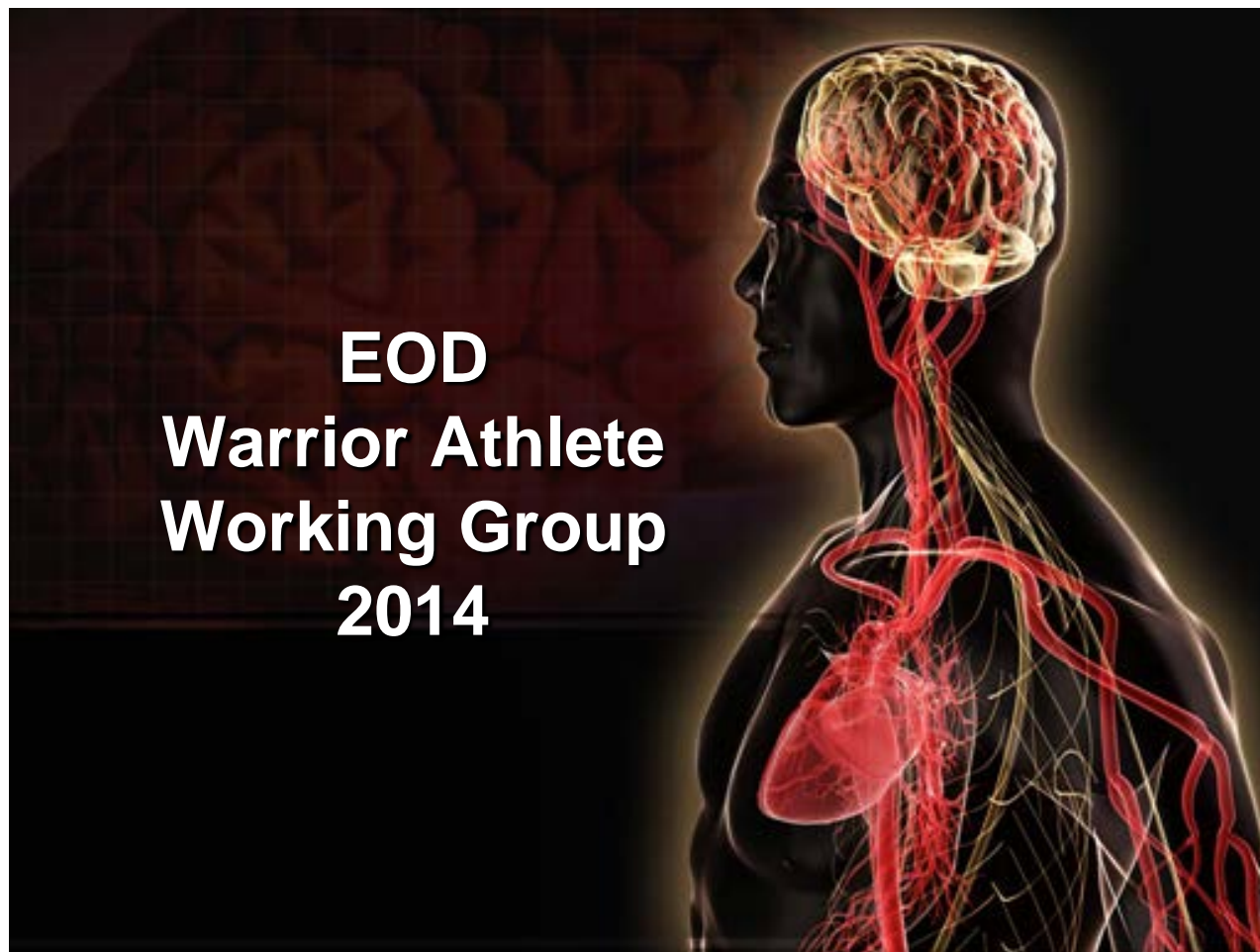
EOD Warrior Athlete Working Group Photo



Top row, left to right: Gerald E. Larson; Jennifer N. Carpenter; Michael S. Stone; Emily A. Schmied; Mitchell J. Rauh; Gena Glickman; EODCS deCiutiis, Marcus K. Taylor; LCDR Dominguez; **Middle row**, left to right: EODCM Leppell; EODCM Stump; Lisa M. Hernandez; CMDCM Beville; EOD1 Munden; LT Dewey; LTJG McElmoyl. **Bottom row**, left to right: Pinata Sessoms; CAPT Robinson; LCDR Haywood; EODCS Anderson; LT Mendenhall; Genieleah A. Padilla; LT Harris; Patrick J. Nardulli. **Not pictured**: Shiloh E. Beckerley; Heidi S. Kraft.

Appendix C

EOD Warrior Athlete Working Group Banner

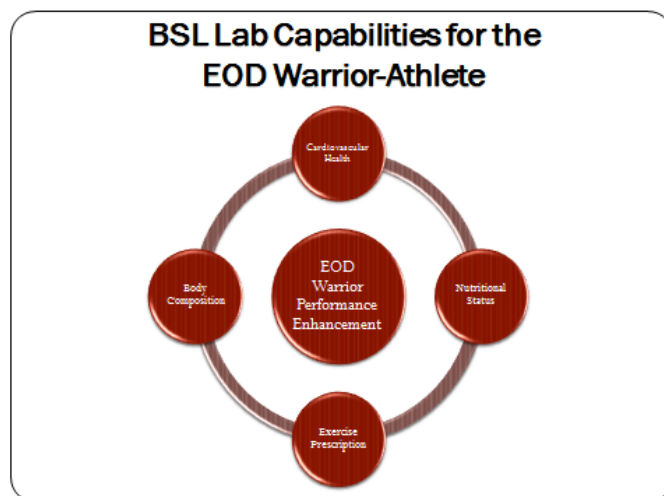
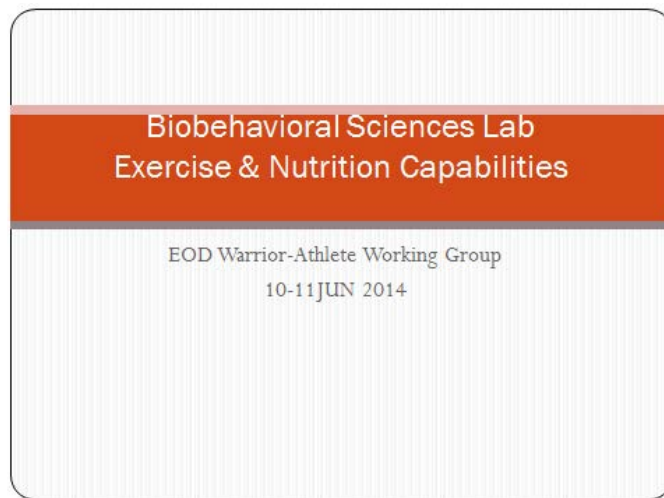


Appendix D

Subject Matter Expert Presentations

Exercise and Nutrition

Lisa Hernandez



Cardiovascular Health

- Cardiovascular Screening
 - Risk assessment & stratification
 - Blood lipids: Total cholesterol, HDL, LDL, triglycerides
 - CRP = C-Reactive Protein (inflammatory marker)
- Electrocardiography = EKG
 - Resting EKGs
 - Treadmill stress tests with EKG

ATHEROSCLEROSIS

The diagram shows a cross-section of a blood vessel. On the left, a healthy vessel is shown with a clear lumen. On the right, a vessel affected by atherosclerosis is shown with a significant buildup of yellowish plaque on the inner wall, which narrows the lumen. Labels include "ATHEROSCLEROSIS", "NORMAL LUMEN", "PLAQUE BUILDUP", and "NARROWED LUMEN".

The figure is a sample EKG (heart rate) graph. It displays multiple leads (I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6) and a time scale. The graph shows a regular rhythm with distinct P waves, QRS complexes, and T waves. The time scale at the bottom indicates a duration of 10 seconds.

Nutritional Status

- Energy Needs Assessment
 - RMR = Resting Metabolic Rate
- Dietary Assessments
- Nutritional Biomarkers
 - Blood lipids, blood glucose, Vit D
- Nutritional Counseling



Body Composition & Bone Density

- Body Composition
 - Measured by DXA (Dual X-Ray Absorptiometry)
 - A "gold standard" of body composition analysis
 - Lean mass
 - Fat mass
- Bone Mineral Density
 - Total body
 - Spine
 - Hips
 - Forearm



Exercise Testing & Prescription

- Exercise Testing
 - Heart rate & blood pressure-continuous monitoring
 - VO_{2max} = cardiorespiratory fitness measurement



- Exercise Prescription
 - Individualized program based upon exercise testing results, thus maximizing performance

Sleep Disruption

Gena Glickman



" I try to do the right thing at the right time. They may just be little things but usually they make the difference between winning and losing."

- Kareem Abdul-Jabbar

Psychological Skills Training

Marc Taylor

&

Operational Stress Control

Patrick Nardulli

Psychological Skills Training

- Goal Setting
- Arousal Regulation (Choking Under Pressure)
- Mental Imagery
- Attentional Control (Shifting)
- Self Talk / Internal Dialogue

PST Implementation

- Education Phase
- Acquisition Phase
- Practice Phase



REPORT DOCUMENTATION PAGE

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6. AUTHORS EODCM Stump, LCDR Haywood, LT Mendenhall, CAPT Robinson, CMDCM Beville, EODCM Leppell, EODCS Deciutiis, EODCS Anderson, EOD1 Munden, LT Dewey, LTJG McElmoyl, Emily A. Schmied, Patrick J. Nardulli, Genieleah A. Padilla, Gerald E. Larson, Lisa M. Hernandez, Michael S. Stone, Jennifer N. Carpenter, LCDR Jose Dominguez, Pinata Sessoms, Gena Glickman, Shiloh E. Beckerley, Heidi S. Kraft, LT Erica Harris, Mitchell J. Rauh, Marcus K. Taylor					8. PERFORMING ORGANIZATION REPORT NUMBER 14-35	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Commanding Officer Naval Health Research Center 140 Sylvester Rd San Diego, CA 92106-3521						
9. SPONSORING/MONITORING AGENCY NAMES(S) AND ADDRESS(ES) Commanding Officer Chief, Bureau of Medicine and Surgery Naval Medical Research Center (MED 00), Navy Dept 503 Robert Grant Ave 2300 E Street NW Silver Spring, MD 20910-7500 Washington, DC 20372-5300						
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13. SUPPLEMENTARY NOTES						
14. ABSTRACT Bottom Line Upfront U.S. Navy Explosive Ordnance Disposal (EOD) operators must perform optimally under the harshest conditions, yet there is no program to build and sustain physical readiness and performance across the EOD career. Thus, there is an urgent need to implement an <i>EOD Warrior Athlete Program</i> . Process Eleven active-duty stakeholders of the EOD community teamed with 15 scientists from the Naval Health Research Center and San Diego State University Doctoral of Physical Therapy Program to outline a comprehensive EOD Warrior Athlete Program. This team was named the EOD Warrior Athlete Working Group. Operational Requirements for EOD Warrior Athlete Program The Working Group outlined specific physical (e.g., muscular strength, aerobic endurance), mental (e.g., performance under extreme stress), and environmental operational requirements (e.g., extreme temperatures, dehydration) for all EOD Warrior Athletes. Critical Elements of the EOD Warrior Athlete Program Three <i>Critical Elements</i> of the EOD Warrior Athlete Program were identified: 1) Exercise Physiology and Nutrition, 2) Injury Prevention and Rehabilitation, and 3) Combat Mindset. Implementation Plan for EOD Warrior Athlete Program The Working Group then identified three Phases of Implementation. They include 1) Assessment (establishes baseline markers of readiness, which will then be used to inform targeted educational approaches and individualized training), 2) Education (disseminates force-wide instructions to optimize physical and mental readiness), and 3) Individualized Training (scientifically-derived training programs meeting the needs of each EOD Warrior Athlete). Cost Estimation and Candidate Funding Lines Scalable cost estimation was provided, and three overlapping funding lines were identified.						
15. SUBJECT TERMS Performance, stress, athlete, injury, exercise, physiology, nutrition, combat mindset, sport psychology, surveillance, assessment, education, training						
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